

ECOSYSTEM BASED MANAGEMENT (EBM) WORKING GROUP
Williams Coast Guard Building

Boston, MA
9:30am to 5:00pm
12 April 2004

MEETING SUMMARY

ACTION: All Stellwagen Bank National Marine Sanctuary (SBNMS) Working Group (WG) Information

Ben Cowie-Haskell, SBNMS, will assemble a summary of Action Plans developed by other groups for the review of the EBM WG.

ACTION: Information from Gloucester Fishermen

David Pierce, MA Department of Marine Fisheries (MA DMF), will provide information concerning what Gloucester fishermen fish for and where they fish.

ACTION: Action Plan Alternatives

The WG determined that each alternative Action Plan would be assigned and written by specific members of the WG and reviewed at the next meeting. All WG members are encouraged to assist in the development of each alternative. The alternative Action Plans have been assigned as follows:

Wilderness: Larry Madin, Woods Hole Oceanographic Institute, Les Kaufman, Boston University, Jon Brodziak, NOAA Fisheries, and John Williamson, Sanctuary Advisory Council (SAC), will develop the alternative Action Plan for the SBNMS to be managed as a wilderness.

Middle Path: Ben Cowie-Haskell, David Pierce, Priscilla Brooks, Conservation Law Foundation, Susan Farady, The Ocean Conservancy, and Tony Wilbur, MA Coastal Zone Management will develop the alternative Action Plan for a compromise middle path.

Sustainable Use: Ed Barrett, MA Fisherman's Partnership, Dave Casoni, Commercial Fishing Industry, Tom DePersia, Big Fish Charters, and Peter Auster, University of Connecticut (UConn), will develop the alternative Action Plan for the SBNMS to be managed for sustainable use.

ACTION: Next Meeting

Next meeting is set for June 3, 2004, at the Williams Coast Guard Building in Boston, MA.

Working Group Attendees (April 12, 2004):

Name	WG Seat / Affiliation	Attendance
John Williamson	SAC Chair	Present
Ben Cowie-Haskell	Team Lead (SBNMS)	Present
David Wiley	Co-Lead (SBNMS)	Not-Present
Peter Auster	UConn, NURC	Present
Les Kaufman	Boston University	Present
Ed Barrett	MA Fisherman's Partnership	Present
Priscilla Brooks	CLF	Present
Susan Farady	The Ocean Conservancy	Present
Jerry Hill	Yankee Fleet	Not-Present
David Pierce	MA DMF	Present
Tony Wilbur	MA CZM	Present
Dave Casoni	Commercial Fishing Industry	Present
Larry Madin	WHOI	Present
Jon Brodziak	NOAA Fisheries	Present
Dierdre Kimball	NOAA Fisheries	Present
Mickael Doeblly	Alternate for Tom DePersia	Present
Chris Kellogg	Alternate for Paul Howard	Present
<i>Others Present</i>		
Timothy Feehan	PSGS	Present

WELCOME AND ADOPTION OF AGENDA

John Williamson, chair, was late due to a previous commitment so Ben Cowie-Haskell welcomed the WG and opened the meeting. The agenda for the meeting was presented and approved by the WG.

OLD BUSINESS AND ACTION ITEMS

Assignment of Straw Man Management Plans for Three Scenarios

Ben Cowie-Haskell reviewed the assignment given for the development of three management plan scenarios. Before presentations were given on each scenario, WG members were directed to ask questions for clarification only. After all the scenarios were presented, WG members were asked to edit them as needed. The scenarios presented to the WG are listed below in the Presentations section of this summary.

PRESENTATIONS

Those members who were assigned to develop management scenarios presented them to the WG. The presentations were given to provide information to all WG members. The scenarios are not considered positions; they are simply straw-man discussion points for the WG. Each scenario will be edited to formulate Action Plans. At this point, WG members were directed to ask questions for the purpose of clarification only, not for document editing purposes.

Action Plan Scenario 1A – National Park Protection/No Extraction: Wilderness Option

The members assigned to the first scenario were Peter Auster, Priscilla Brooks, Susan Farady, and Deirdre Kimball. This group decided it was more appropriate to develop two scenarios. Peter Auster reviewed Scenario 1A, which is a more extreme case that describes managing the Sanctuary as an area that supports a community of life untrammelled by humans, where natural character and influence are maintained, such that: (1) the site generally appears to have been affected primarily by the forces of nature, with the imprint of human actions substantially unnoticeable; and (2) has outstanding opportunities for solitude or a primitive and unconfined type of recreation. The scenario presented to the WG is shown in Appendix A.

Questions & Answers

Question 1: If we wanted the most extreme scenario, would we be able to prevent all vessels from entering the Sanctuary?

Answer: We would not be able to do that. The International Maritime Organization (IMO) Treaty prevents that. It is beyond the scope of the Sanctuary.

Question 2: Was mention of boundary extension for the Sanctuary purposely not included, or was it simply overlooked?

Answer: It was overlooked. Presently there is no rationale for boundary extension for the Sanctuary. That is something that could be done later, after some quantitative assessment has been done for the Sanctuary.

Comment: WG members stated that boundary extension should be termed “boundary alteration”. Scoping comments were for making the Sanctuary larger, potentially to include Jeffrey’s Ledge, since whales move in and out of the Sanctuary. However, “boundary alteration” would include the possibility of reducing the size of the Sanctuary, which is another viable option. It is important that the issue of altering the Sanctuary boundaries be addressed in one of the action plans of this group.

Question 3: How would boundary alteration affect this particular scenario?

Answer: It really would not have an affect on this scenario. This is a question for society. If society values a place like a wilderness, they may want to have larger areas. It is important to recognize that the Sanctuary is a small area within the larger ecosystem of the Gulf of Maine (GOM).

Question 4: Looking at the stated definition for a wilderness, the SBNMS is already a heavily impacted area. Would this definition work for a marine environment like that of the Sanctuary?

Answer: This scenario could be a management goal. The definition for a wilderness was used simply to provide a definition to work with for this straw-man scenario. It could be a goal to consider the Sanctuary a wilderness from some set time hence, allowing the Sanctuary to develop with no further impacts. The Sanctuary does not have to be historically pristine to be classified as a wilderness.

Action Plan Scenario 1B – National Park Protection/No Extraction

The members assigned to the first scenario were Peter Auster, Priscilla Brooks, Susan Farady, and Deirdre Kimball. Due to the group’s decision to develop two scenarios, Scenario 1B was developed. This scenario recognizes resource protection while permitting limited compatible uses by: (1) preserving biodiversity and ecological integrity of Sanctuary resources; (2) protecting unique and sensitive habitats from the impacts of human activities; (3) providing the best opportunities possible for scientific research within the Sanctuary; and (4) utilizing a precautionary approach in determining compatible uses of

Sanctuary resources. Susan Farady reviewed Scenario 1B. The scenario presented to the WG is shown in Appendix B.

Questions & Answers

Question 1: Should we have a definition for ecological integrity?

Answer: If a specific level for any ecological metric is set, and that level is what you want, it has ecological integrity. Ecological integrity can be variable and subject to interpretation. It would be beneficial to have a clear definition for ecological integrity. It is important that metrics and thresholds be addressed to go along with any proposed definition.

Comment: It would be hard to make a specific, legal regulation for metrics and thresholds. There is the potential that something would be overlooked. We need to have site-specific metrics and thresholds that are conceptual, but not specific. They need to be reasonable.

Question 2: Could this scenario incorporate the protection of cultural resources?

Answer: There is no problem with doing that within the current resource protection provision under the Sanctuaries Act. This would have overlap with other working groups. This issue may not be appropriate for the EBM WG. There is a whole action plan devoted to protection of heritage resources.

Action Plan Scenario 2 – Balanced Protection and Extraction

The members assigned to the second scenario were Jon Brodziak, Les Kaufman and Ben Cowie-Haskell. Jon Brodziak reviewed Scenario 2, which is based on balancing protection and extraction by managing the Sanctuary by: (1) protecting resources and in particular, sustaining biodiversity; (2) reducing habitat impacts from fishing; (3) maintaining and monitoring extractive uses; and (4) reducing negative impacts on threatened species. The scenario presented to the WG is shown in Appendix C.

Questions & Answers

Question 1: What exactly is adaptive management?

Answer: Adaptive management is when a management tool is put in place to achieve a specific goal and is evaluated to determine its effectiveness. If the goal is not achieved, adjustments need to be made to the tool or regulation. Regulations should be flexible enough to adapt to the goals set by management.

Question 2: With the proposed extension to the Western GOM closed area, what would it be closed to?

Answer: It depends upon what questions you want answered as far as research is concerned. The Sanctuary itself is stratified in terms of habitat, and it is important for the Sanctuary to know what would happen in an area with no impacts. This would help determine how effective management measures are. The “sliver” has been closed to mobile fishing already. Now we have a habitat closure that will remain in effect indefinitely.

Question 3: In terms of a Vessel Monitoring System (VMS), should other fishing vessels like tuna, lobster, and charter vessels be outfitted with VMS?

Answer: Everybody should be included. The question is to increase or decrease restrictions on a resource. We need to track the availability of that resource by monitoring all vessels.

Question 4: What would be gained by moving the boundary of the Western GOM closed area?

Answer: We would gain more habitat diversity. It is conceivable to open other areas of the Western GOM closed area to gain more habitat diversity. But, from a Sanctuary standpoint though, the “sliver” should remain closed.

Question 5: What about restricting purse seine vessels?

Answer: It would have the intent of protecting herring. Even with the open nature of the Sanctuary system, we could have a general ban on herring fishing within the Sanctuary. This would include all herring vessels, keeping the resource undisturbed within the Sanctuary. However, there is only limited survey data. Detailed data from commercial activities should be recorded.

Question 6: In terms of datasets, what data is insufficient?

Answer: The benefit would be in knowing what is going on inside versus outside the Sanctuary. Currently, we have the spring and fall trawl surveys. However, the number of sampling sites within the Sanctuary is low creating an insufficient dataset for temporal variations. We are working towards gaining more data for this.

Comment: WG members felt that it was important to also maintain and monitor other extractive uses within the Sanctuary. If there is other extractive, or otherwise impacting uses within the Sanctuary, they need to be accounted for. It would be important for the EBM WG to know the issues being brought up in the other working groups. Accounting for these issues could potentially prevent commercial fishing from always being a target.

Question 7: This scenario proposes voluntary provisions for recreational fishing vessel trip data reporting. Why make it voluntary instead of mandatory?

Answer: Provisions being voluntary is a concept of incremental progress. We do not want unnecessary regulations when we do not need them. Information would be gathered by providing an incentive. It would be beneficial to establish records of activity.

Question 8: For studying bottom impacts, could you use other areas? Do you really have to use areas within the Sanctuary?

Answer: Other areas outside the Sanctuary could potentially be used. It depends on the question you want to ask.

Action Plan Scenario 3A – Sustainable Extraction: Sustainable Use and Protection Option

The members assigned to the third scenario were Ed Barrett, David Casoni, Tom DePersia, and David Pierce. David Pierce reviewed Scenario 3A, which describes managing the Sanctuary using the sustainable extraction of resources by recognizing: (1) the Sanctuary's uniqueness is substantially due to its importance as a coastal fishing ground at the doorstep of many Massachusetts' coastal communities and fishing ports; (2) Sanctuary bottom and water column habitats are impacted to varying degrees by human activities such as waste disposal, commercial fishing, shipping, cruise ships and cable-laying in the southwestern Gulf of Maine, especially in the Sanctuary itself; (3) fisheries management/conservation and habitat protection in the Gulf of Maine, including the Sanctuary, are the responsibility of the New England Fishery Management Council, acting under the authority of the Sustainable Fisheries Act, and coastal states; and (4) the Sanctuary is not a closed system but is part of the dynamic Gulf of Maine ecosystem. The scenario presented to the WG is shown in Appendix D.

Questions & Answers

Question 1: When focusing on gaining additional information, what entity would put forth needed management measures?

Answer: It was decided that the New England Fisheries Management Council (NEFMC) would do what was needed. We don't know enough to conclude what areas should be closed to fishing. When we have that information, we can have the Council move to protect particular areas.

Comment: WG members noted that based on predator-prey relationships for dogfish, a dogfish fishery would be favorable in the SBNMS to help bring cod stocks back up. October and November rolling closures should end, as they tend to aggregate effort in the month of December.

Comment: Two types of data are being collected. These are correlative and experimental. WG members felt that more experiments were needed on impacted and non-impacted areas to increase confidence in the data. For example, looking at the correlative data, the issue with dogfish predator-prey relationships is refuted. If more experiments were conducted, more could be done with management.

Comment: Some WG members expressed that as to the information needs presented in this scenario, the current studies on inshore fishing grounds are not meant to characterize the importance of these fishing grounds and should not be considered a “survey”.

Question 2: What is deceptive about the Sanctuary poster depicting boulder reef habitat?

Answer: It comes across as a snapshot, but it is more of a compilation of the potential diversity one might see on a boulder reef. It is an artist’s rendition of boulder reef habitat based on a large number of photographs taken from a remotely operated vehicle.

Comment: Other WG members stated that the educational poster shows what is found on boulder reefs. The boulder reef complex contains this kind of diversity. It is representative of the diversity of species on boulder habitat.

Question 3: Why is there no recognition of the future role of closed areas in the Sanctuary?

Answer: The Council is moving for a habitat closure in the Western GOM closed area. If additional closed areas are deemed necessary, they should be made through the Council.

Comment: Some WG members stated that already closed areas should be allowed to provide information on what they were designed for initially. There has not been enough time to determine the validity of the old closures before making new ones.

Question 4: Has it been concluded that representative habitats in the “sliver” are enough for research?

Answer: Deep mud habitat is poorly represented in the Sliver (1% of the sliver area). So the answer is no.

Comment: Some WG members suggested that the Sanctuary should consider temporary closures as management techniques and long-term closures for experimental purposes. Areas for these closures would have to be identified. This could help incorporate biological processes in the Sanctuary’s management goals.

Comment: Some WG members expressed concern that closures already classified as temporary have not been re-opened to fishermen except for special access like scallops. It was also suggested that if an area is closed for experimental purposes, a comparable area already closed should be opened to offset the impacts on user groups.

Comment: A few WG members stated that the boundaries for the Western GOM were originally designed to capture high catch rates for cod where:

- It occurred year round.
- Impacts could be distributed across three states.

- Impacts could be distributed across gear types and vessel sizes.
- A representative amount of cod habitat could be encompassed.

Three quarters of the Western GOM closed area will now be part of a habitat closed area. It is possible that this could be changed to account for a variety of species and the habitats for those species. An analysis is currently being done on this issue.

Question 5: If funding is insufficient and the data inadequate, why should we consider closing more area?

Answer: That is understandable. If an area is closed to answer a specific question, but it is not used to get the answer, it can be a problem.

Question 6: Considering non-fishing impacts, are there any other cables, pipelines, or wind farms being proposed within the Sanctuary?

Answer: Not that we currently know about.

Comment: It was suggested by some WG members that if the WG wanted to really think outside the box for non-fishing impacts, it should realize that the Sanctuary could be impacted by eutrophication caused by land-based activities and pollution. Some sort of development cap should be considered in the watershed for the whole GOM.

Action Plan Scenario 3B – Sustainable Extraction: Status Quo Management Option

Originally, the third scenario was assigned to the WG members listed above. However, unsure if a Scenario 3 was delivered, Peter Auster developed and reviewed another version, called Scenario 3B. Scenario 3B describes managing the Sanctuary by allowing the exploitation of resources under the current management of regional authorities without additional management actions from the Sanctuary. The scenario presented to the WG is shown in Appendix E.

Questions & Answers

Question 1: Are the jurisdictions of all the management authorities enough to manage the Sanctuary?

Answer: It depends on what the questions and definitions are. There is no NOAA Fisheries mandate to protect biological diversity, and a level for biological diversity has not been established. If you want to manage to prevent localized extinctions then no action needs to be done based on existing data. If you want to manage the Sanctuary to preserve processes and population interactions, then more action might be needed.

Comment: WG members expressed that this particular scenario would put responsibility for protecting the Sanctuary on other agencies while other scenarios actively attempt to protect the resources through the sanctuary's authority.

Question 2: If the NEFMC does not happen to do something, through oversight or some other reason, can the Sanctuary push to have an action taken?

Answer: Yes, the Sanctuary can recommend that actions be taken and has done so in the past.

Comment: WG members suggested that this could make the Sanctuary a watchdog of all the local authorities. The Sanctuary should provide the NEFMC a list of what is needed. The Sanctuary can recommend that the Council do something. The NEFMC will be able to act on an issue, provided that the information presented to it is based in fact.

Comment: Other members expressed that the NEFMC is demonstrating that it is more responsive to management needs, however the Council will not specifically address biodiversity. The lack of

very large fish within populations is an issue. Managing fish stocks for maximum sustainable yield (MSY) does not effectively allow large fish to remain in the population, while managing fish stocks for optimum yield (OY) might allow this. The Council has been tasked with decreasing fishing mortality to get a larger age composition and is struggling to get fishing mortality below natural mortality. With MSY, mid-sized fish are favored as they are investing more energy on growth and increase biomass. Large fish are less favored, and it is unknown what effect large fish have on the overall food web.

Comment: Some WG members stated that many more large cod are being seen in the population today. Obviously, today's population is much different than when there was no fishing at all. Management has made a fisheries management plan and managed fishing well. There have also been different fishing techniques developed to make gear selective.

ACTION PLAN DEVELOPMENT

Discussion of Scenarios

The Chair encouraged open discussion over the development of draft Action Plans from the information presented in the above scenarios. Issues raised during this discussion are noted below.

Issue 1: Number of Action Plans

Concern was raised by many WG members over how many Action Plans should be developed.

Discussion: WG members were unsure if one Action Plan could be developed given the diverse nature of the WG. Reaching a consensus could prove to be difficult. However, members felt that it was important to look carefully at the presented scenarios and try to come to a consensus. It was determined that if three different plans were to be developed, each one would have to be presented equally in order to allow the SAC to decide which was most appropriate. It was felt that the role of the WG was to present the SAC with expert information needed for that decision. Writing a particular plan to look most appealing over a range of plans could not be considered.

Members hoped that the Action Plan or Plans could be developed by the June SAC meeting date. The process of developing one particular Action Plan reached by consensus may take longer. The Group was polled to determine how to proceed. WG members expressed that two plans encompassing the most extreme scenarios should be written, as well as a third plan that would be considered a middle ground scenario. The three proposed Action Plans are listed below.

Comment: WG members noted that this issue was discussed and decided upon at the last meeting. The three main scenarios were developed to avoid contentious issues that could bring the WG to a standstill. Trying to make the WG reach a consensus on one particular Action Plan may force members to defend one Action Plan over another.

Comment: It was determined by WG members that WGs should not be in the process of making minority or majority reports and that the WG was created to provide expert information. Recommendations should be given to the SAC with equal status, where final decisions would be made.

Comment: Some WG members advised caution in considering more than one Action Plan. A rationale for using multiple Action Plans would have to be developed. Consensus on one plan might be difficult; however, the middle range is most important. Focus should be placed on what

is not being identified by other working groups. The extreme scenarios present potential ecosystem change and social impacts that is undesired. Therefore, one Action Plan developed from the middle ground should be the WG's focus.

Issue 2: Overlapping Issues

WG members were concerned that overlap between the various WGs could become an issue.

Discussion: With other WGs finishing their Action Plans, it could be possible to see where overlap may be occurring between groups. WG members expressed an interest in knowing what issues have been presented by these groups to determine if potential conflicts exist. This information would help maintain consistency between WGs. However, consistency is not necessary since all recommendations will be reviewed by the SAC to determine the appropriate next steps. WG members felt that knowing which issues intersected with other WGs would be instructive and could help in formulating Action Plans. Gathering recommendations from other experts would help reduce conflict between Action Plans and avoid any confusion in the SAC.

Comment: WG members determined that knowing the recommendations being made by other WGs would be important. There is considerable overlap between WGs, particularly with the Ecosystem Alterations WG. Knowing potential conflicts, or issues that could be integrated, would be of considerable help.

Comment: Some WG members stated that individual WGs did not need to be consistent. Recommendations are being created by the assembled experts for each group, to provide the SAC with the information it needs to make decisions.

Issue 3: The Three Proposed Action Plans

After deliberating over the issue of having multiple Action Plans, the WG decided on developing three distinct plans. These plans are as follows:

- Wilderness – The Sanctuary would be managed as a wilderness as presented in Scenario 1A.
- Middle Path – The Sanctuary would be a combination of scenarios to balance resource use with resource protection.
- Sustainable Use – The Sanctuary would be managed to utilize resources in a sustainable manner, as described by Scenario 3A and Scenario 3B.

Straw-man Action Plans will be developed as described in the third Action Item at the beginning of this summary.

Discussion: WG members determined that three separate Action Plans would be appropriate. It was recognized that the scenarios could potentially be combined into an active or a passive role for the Sanctuary. The WG felt, however, that a middle path alternative should be included. This would provide common ground between all members of the WG. This middle path should combine elements from each of the presented scenarios, allowing for a balance between resource utilization and resource protection. WG members expressed that the Action Plans that would be developed should direct management to move from using correlative data to experimental evidence in decision-making. Provisions should also be made for the accumulation of diversity and biomass.

Comment: WG members suggested that the scenarios presented provided two distinct paths. The first is a passive role, as shown in the third scenario where the Sanctuary would act as a

watchdog. The second is an active role, where the Sanctuary would actively manage resources. Based on these ideas, two Action Plans could be constructed.

Comment: WG members acknowledged that the proposed Middle Path Action Plan might become preferable to all members. In this case, a consensus could be reached on a single Action Plan to present to the SAC.

NEW BUSINESS

Alternative Action Plan Development

The WG discussed what should be done with the proposed three alternatives. It was decided that the information presented in the scenarios above, in the Presentations section of this summary, should be edited and refined to make straw-man draft Action Plans. Each alternative was assigned to specific WG members to be drafted and presented at the next meeting. The alternatives were assigned as indicated in the third Action Item at the beginning of this summary.

Next Meeting

The WG was polled for possible dates for the next meeting. The next EBM WG meeting will be held June 3, 2004 at the Williams Coast Guard Building in Boston, MA.

FINAL COMMENTS

Meeting adjourned at 5:00 pm.

Gerry E. Studds Stellwagen Bank National Marine Sanctuary
Management Plan Review
Ecosystem-based Management Working Group – Draft Agenda

Date: 12 April 2004
Location: Williams Coast Guard Building
2nd Floor Conference Room
408 Atlantic Ave.
Boston, MA
781-424-0699

TIME	TOPICS AND OBJECTIVES
9:30-9:45	<ul style="list-style-type: none">• Welcome (coffee and pastries provided)• Progress update<ul style="list-style-type: none">• Review and approval of meeting summary <p>Discussion Leader: John Williamson</p>
	Note : During presentations we will ask questions for clarification only.
9:45-10:30	<ul style="list-style-type: none">• Presentation: Scenario I Peter Auster with Susan Farady, Priscilla Brooks, and Deirdre Kimball <p>Objective: Understand goal and assumptions of scenario</p>
10:30-11:15	<ul style="list-style-type: none">• Presentation: Scenario II Jon Brodziak with Les Kaufman and Ben Cowie-Haskell <p>Objective: Understand goal and assumptions of scenario</p>
11:15-12:30	<ul style="list-style-type: none">• Presentation: Scenario III David Pierce with Ed Barrett, Tom DePersia, and Dave Casoni <p>Objective: Understand goal and assumptions of scenario</p>
12:30-1:00	Lunch- (provided)
1:00-4:30	<p>Roundtable discussion of costs and benefits of each scenario</p> <p>Objective: Develop revised scenarios</p>
4:30-5:00	Reiterate agreements and next steps

APPENDIX A Scenario 1A

SCENARIO I for Ecosystem-based Sanctuary Management

4/12/04

Members: Peter Auster (lead), Priscilla Brooks, Susan Farady, Deirdre Kimball

Note that our task is to insure that the scenario meets the definition of EBSM as follows:

Ecosystem-based sanctuary management (EBSM) integrates knowledge of ecological interrelationships to manage impacts within sanctuary boundaries. The general goal of EBSM is to protect the ecological integrity of the Stellwagen Bank National Marine Sanctuary while recognizing that the sanctuary is nested within the Gulf of Maine large marine ecosystem. Effective implementation of EBSM should: (1) consider ecological processes that operate both inside and outside sanctuary boundaries, (2) recognize the importance of species and habitat diversity, and (3) accommodate human uses and associated benefits within the context of conservation requirements.

Here I use a definition of ecological integrity from Parks Canada:

Ecological integrity means, with respect to [SBNMS], a condition that is determined to be characteristic of its natural region and likely to persist, including abiotic components and the composition and abundance of native species and biological communities, rates of change and supporting processes.

The scenario must discuss the following topics. At the outset, consider that I have not included anything that I feel should be set in stone and all that is contained here is meant to serve as a starting point for discussion.

1. Overall goal(s) for scenario

Here is where the final four words of our definition of EBSM are open to interpretation. The scenario for our consideration is one akin to a “National Park”. Unfortunately, the definition of a generalized “National Park” is as ambiguous as a “National Marine Sanctuary”. Given that it was my big mouth that came up with the name for this distal end of the conservation spectrum, I suggest we simply use the definition of “wilderness” from the Wilderness Act as a starting point for this scenario. Wilderness is defined as:

“an area where the earth and its community of life are untrammelled by man, where man himself is a visitor who does not remain. An area of wilderness is further defined to mean ... an area of undeveloped Federal land retaining its primeval character and influence, without permanent improvements or human habitation, which is protected and managed so as to preserve its natural conditions and which (1) generally appears to have been affected primarily by the forces of nature, with the imprint of man's work substantially unnoticeable; (2) has outstanding opportunities for solitude or a primitive and unconfined type of recreation; (3) has at least five thousand acres of land or is of sufficient size as to make practicable its preservation and use in an unimpaired condition; and (4) may also contain ecological, geological, or other features of scientific, educational, scenic, or historical value.”

This definition is a direct quote from the Act. We can obviously edit the text to focus on SBNMS and turn it into a “goal” statement, such as:

SBNMS will be managed as an area that supports a community of life untrammelled by humans, where natural character and influence are maintained, such that: (1) the site generally appears to have been affected primarily by the forces of nature, with the imprint of human actions substantially unnoticeable; and (2) has outstanding opportunities for solitude or a primitive and unconfined type of recreation.

2. How does it meet the goals of the Sanctuaries Act?

This goal emphasizes “the primary objective of resource protection”. Decisions regarding allowable activities will require a compatibility analysis. I can foresee the elimination of use of mobile fishing gear (seafloor imprint is large and removal of large numbers of prey items with pelagic trawling is inconsistent with the goal of “life untrammelled by humans”). However, a level of recreational hook and line fishing, constrained within some acceptable limit (e.g., low effort with the goal of maintaining size class distributions, fishing within slot limits) could be allowed. These activities fit within the goal of the Sanctuary Act to “facilitate to the extent compatible” various human uses within our conservation context. Further, such actions are within the context of our specific goal for this scenario where “the imprint of human actions [are] substantially unnoticeable” and “primitive” types of recreation (based on historical accounts of early humans using hooks and spears to catch fish). Whale watching could be managed to limit the number of vessels within a particular radius such that passengers are allowed a feeling of a “wilderness” sea (i.e., eliminate the large number of vessels (commercial and private) that aggregate near individual whales now and sometimes make give the experience the “caught in the big dig” sort of feeling.

3. Information needs in order to implement the scenario? For example, in order for this scenario to work what do we need to know about how the system functions (humans included)?

Human use indicators with thresholds to set use limits.

Indicators and thresholds for determining the recreational value of the site (e.g., answer the question: how many vessels engaged in a particular activity, at what distance, degrades the experience of being in a “sanctuary”?).

Population estimates for exploited taxa and thresholds for exploitation in the context of the goal statement.

others?

4. Management tools needed to implement the scenario? For example, if conservaton of biological diversity is one goal of option than what tools are needed to achieve this goal- regulations? (who promulgates them?); zoning (where? how big? how many? by whom?); voluntary measures (what are they?); boundary modification (where?);

Human use limits (perhaps in zones) would need to be implemented and managed by SBNMS.

Fishing limits could first be evaluated by NEFMC/MAFMC and NMFS for the various fisheries (e.g., demersal fishes, tunas).

5. Indicators or metrics needed to assess effectiveness of scenario? Example: If the goal of this option is sustainable extraction than how are we going to know that we are removing fish, etc. at sustainable levels and rates? What do we monitor? (what indicators? by whom? how often?)

Human use indicators

Population estimates of sentinel species.

APPENDIX B
Scenario 1B

Highly protective Ecosystem-based Management scenario #1b

4/9/04

1. Overall goal(s) for scenario:

SBNMS will be managed as the only National Marine Sanctuary in the region with a distinct goal under the Sanctuary Act, and as an area with unique and important ecological qualities in the Gulf of Maine that shall be protected and conserved by:

- a. preserving biodiversity and ecological integrity of Sanctuary resources,
- b. protecting unique and sensitive habitats from the impacts of human activities,
- c. providing the best opportunities possible for scientific research within the Sanctuary, and
- d. utilizing a precautionary approach in determining compatible uses of Sanctuary resources.

2. How does it meet the goals of the Sanctuaries Act?

This scenario goal meets and enhances the goals of the Sanctuary Act by specifying what the primary purpose of resource protection within the Sanctuary means, by emphasizing the importance of research opportunities to achieve resource protection and achieve the Act's purpose of facilitating research, and by strengthening the concept of 'compatible' use by utilizing a precautionary approach to assess activities using Sanctuary resources. This scenario also meets the goals of the Management Plan Review process by addressing many of the concerns voiced by the public about protecting Stellwagen's ecosystem and examining existing boundaries, and acknowledges the need to coordinate with other agencies and other Working Groups.

3. Information needs in order to implement the scenario (for example, in order for this scenario to work what do we need to know about how the system functions (humans included))?

- a. geological and sediment information
- b. identification of different habitat types, including particularly unique or sensitive habitats
- c. information on habitats/areas that are frequented by animals that are of particular concern to the Sanctuary, for example marine mammals, other endangered species such as sea turtles, species of concern such as seabirds, selected fish species
- d. information on the location, composition, and sensitivity of ecological communities, (ex. boulder reef communities, mud bottom communities, etc.)
- e. location of human activities using or impacting Sanctuary resources (ex. vessel traffic lane, whale watching activity, fishing activities, etc.)
- f. limitations imposed by other regulatory schemes within the Sanctuary (ex. location of existing federal and state fishing management zones, location of existing marine mammal protected areas, etc.)
- g. assessments using a-f above and other information as needed to identify areas of particular concern where Sanctuary resources need increased protection to accomplish this scenario's EBM goal and meet the Sanctuary Act's requirements.

4. Management tools needed to implement the scenario (for example, if conservation of biological diversity is one goal of option than what tools are needed to achieve this goal- regulations? who promulgates them?; zoning where? how big? how many? by whom?; voluntary measures, what are they?; boundary modification where?):

A. Zoning schemes to reduce/eliminate/prevent impact of human impact on Sanctuary resources.
The number and size of such zones and activities conducted within them depends on the goal to

be achieved (for instance, a goal to reduce or eliminate activities affecting benthic habitat to provide research site to assess the recovery of benthic communities from adverse impacts will instruct what areas and what activities should be considered to meet that goal) but at least the following types of zones including no-take areas should be contemplated as necessary to best achieve protection of Sanctuary resources:

1. Identification of representative habitats and associated communities within the Sanctuary and actions needed to reduce/eliminate/prevent harmful human impacts on at least one area of each representative habitat in the Sanctuary to be implemented by the Sanctuary in coordination with other agencies as required
2. Identification of unique and sensitive habitats within the Sanctuary and actions taken to reduce/eliminate/prevent harmful human impacts on unique and sensitive habitats to be implemented by the Sanctuary in coordination with other agencies as required
3. Establishment of appropriate scientific research areas including unimpacted control sites as needed to achieve Sanctuary research goals to be implemented by the Sanctuary in coordination with other agencies as required

B. Assessment of existing Sanctuary boundaries to determine if they adequately encompass the ecological features of the Sanctuary and protect Sanctuary resources.

C. Supporting and integrating other management actions developed by other Working Groups.

It is anticipated that other Working Groups may propose management actions that will protect Sanctuary marine mammals and water quality resources, such as limits on vessel conduct or fishing activities that affect marine mammals, or limits on vessel discharges that affect water quality. If such actions are not proposed by those Groups, this scenario should revisit those resources and develop management actions consistent with the scenario's goal and the Sanctuary Act's goals of resource protection and compatible use. Furthermore, if the Ecosystem Alteration WG recommends specific actions in addition to the ones previously mentioned, this scenario should revisit and develop such management actions. All actions should to be implemented by the Sanctuary in coordination with other agencies as required.

5. Indicators or metrics needed to assess effectiveness of scenario (example: if the goal of this option is sustainable extraction than how are we going to know that we are removing fish, etc. at sustainable levels and rates? what do we monitor? what indicators? by whom? how often?)

1. regular assessment of biodiversity
2. regular assessment of selected sentinel species
3. regular assessment of health and function of representative habitats and unique and sensitive habitats
4. numbers of uses and users within the Sanctuary
5. types and amount of research conducted and results

APPENDIX C

Scenario 2

A Middle Path: Some Options to Balance Resource Protection and Extractive Uses of Stellwagen Bank National Marine Sanctuary

Jon Brodziak, Les Kaufman and Ben Haskell

April 12, 2004

The general goal of the middle path is to balance protection and extraction.

Operational goals include, but are not limited to:

1. Protect resources and in particular, sustain biodiversity
2. Reduce habitat impacts of fishing
3. Maintain and monitor extractive uses
4. Reduce negative impacts on threatened species

Achieving goals 1, 2, and 4 would directly help to protect the ecological integrity of the SBNMS. Protection of Sanctuary resources is a specific requirement of the Sanctuaries Act. The appropriate amount of protection is a source of debate among stakeholders. In this context, we advocate taking a few simple and direct steps that are likely to achieve greater protection in the short term without severely curtailing existing extractive uses.

Monitoring is a central component of goal 3 and the potential success of this scenario. Informed Sanctuary management requires an innovative approach to monitoring and understanding the consequences of human uses. Ideally, this would entail a non-destructive monitoring program for key species assemblages (e.g., fishes and benthic communities) as well as a verifiable (e.g., mandatory) program for human uses (e.g., recreational fishing, commercial fishing and whale watching). In practice, progress towards the implementation of goal 3 would be incremental and would be subject to stakeholder input on adjustments to the existing management system. In particular, changes to management of fishing practices would be made by the NEFMC in consultation with NOAA Fisheries and the SBNMS managers. Taken as a whole, the four operational goals conform to Sanctuaries Act's requirements for conserving resources and accommodation of non-harmful extractive uses.

We formulated a minimal set of specific action items to make progress towards achieving these operational goals. These items were chosen because they are easy to understand, pragmatic and likely to be effective for improving Sanctuary management in the near term.

Action Items to Balance Protection and Extraction

1. Request that the NEFMC implement a 10-year ban on pair trawling for Atlantic herring (*Clupea harengus*) in SBNMS. A primary rationale for this request is to protect the herring resource within SBNMS since it is a primary forage species for other Sanctuary resident and migratory resources. This action takes into account the open nature of SBNMS system since it is recognized that other factors outside SBNMS will affect the herring resource. In particular, this action seeks to limit the potential negative impacts of mid-water trawling on herring distribution. A secondary rationale for this request is that the tuna fishing fleet may benefit from a ban on pair trawling by enhancing catch rates within SBNMS. The catch rates of bluefin tuna within and near SBNMS

would provide a metric to evaluate the potential impact of banning pair trawling for herring. The 10-year period frame would provide sufficient time to observe whether herring distribution and tuna fishing catch rates had changed within SBNMS. To this end, tuna fishing vessels would be requested to voluntarily provide logbook information on sets within SBNMS for the purpose of monitoring catches and catch rates. SBNMS, NEFSC, and NOAA Fisheries would evaluate the impacts of the pair-trawling ban after a 10-year period and a decision would be made to continue, modify, or cease the ban.

2. Implement a voluntary speed limit on whale watch vessels within SBNMS. The primary rationale for this request is to reduce the possibility of whale watch ship strikes of endangered northern right whales within SBNMS. Whale watch industry participation would be voluntary. Participating firms would receive a certification from SBNMS that their vessels were “whale friendly” by the Sanctuary. In this context, participating firms would be permitted to advertise their certification. Compliance would be monitored on an as needed basis, through submission of vessel track coordinates or onboard monitoring with GPS.
3. Request that the NEFMC implement a 10-year spatial extension of the WGOM closed area’s boundaries to 70 degrees 20 minutes West and 42 degrees 15 minutes North within SBNMS. The primary rationale for this request is the fact that there has been substantial public criticism of the SBNMS’s approach to resource protection in the scoping comments for the management plan revisions. The lack of direct experimental information on the effects of fishing in SBNMS makes it impossible to directly address the issue of whether habitat conservation is adequate. To address this vital long-term information need, the requested extension would create a new adaptive management zone between the Sanctuary’s eastern boundary and 70 degrees 20 minutes West within SBNMS. The adaptive management zone would be intensively surveyed in years 1-5 of the 10-year period using ROV, trawl, and other sampling gears. The extension would enable researchers to evaluate the impact of closing the adaptive zone to mobile gear impacts for a 10-year period. This would also facilitate comparisons of long-term closure with the WGOM closed area, which will have been closed for roughly 6 years at the beginning of 2005. The 10-year time period for closure was chosen based on research by Collie and others that benthic impacts of trawls and dredges may take on the order of 5-10 years for recovery. Ideally, portions of the adaptive management zone that were closed to fishing in 1998 would be reopened under experimental fishing permits to provide rigorous scientific comparison of before and after closure effects. This would provide a wealth of experimental data on the habitat effects of closure. This would primarily affect fishing operations in Block 124 within SBNMS (Figure 1). This Block is presently subject to rolling closures under the current groundfish management plan but is open during certain months of the year. Block 124 is an important fishing area for the Gulf of Maine cod stock. A reduction in fishing pressure on Gulf of Maine cod within SBNMS would enhance the opportunities for rebuilding this depleted stock which is currently under a 10-year rebuilding plan.

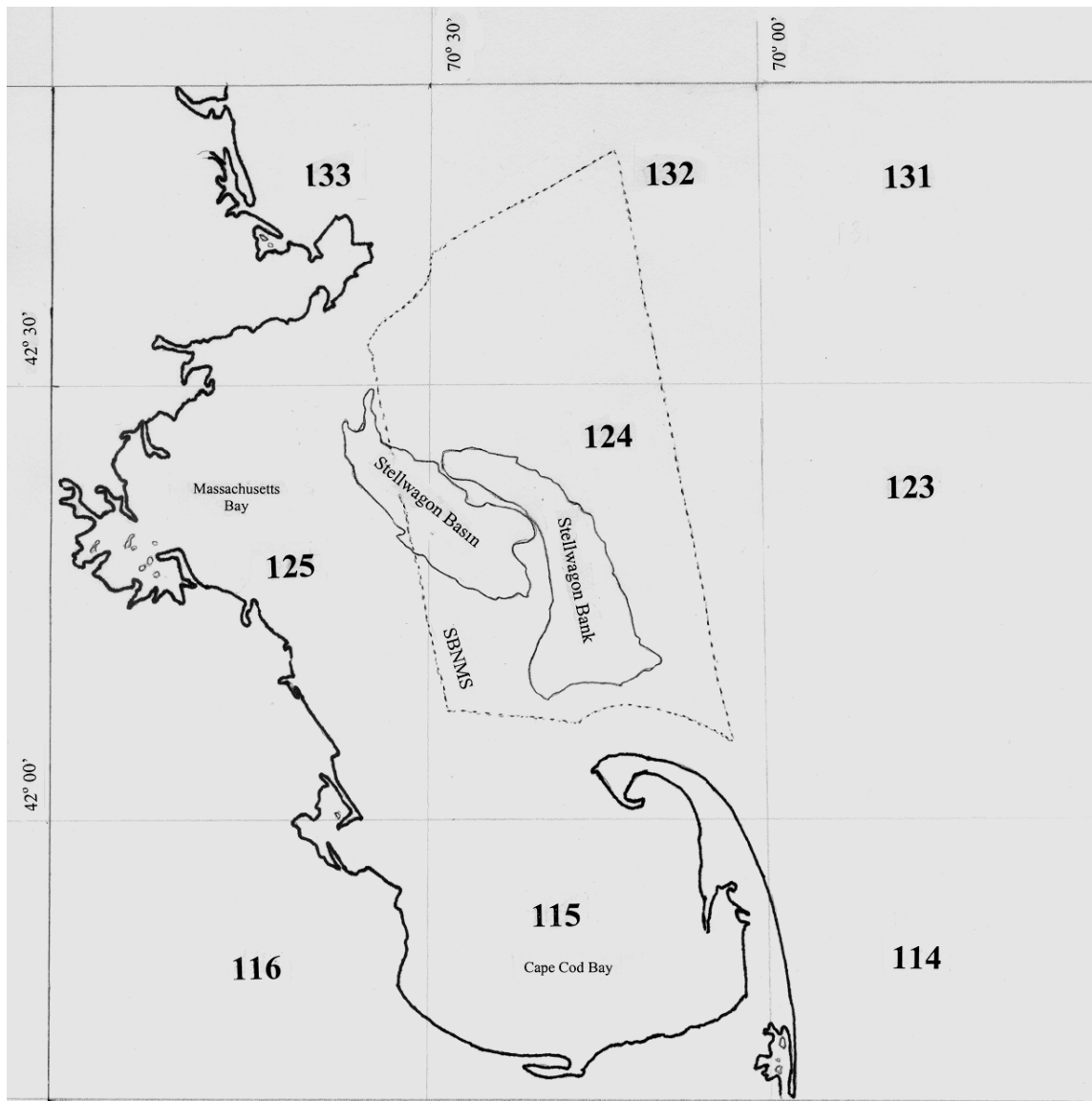


Figure 1. Stellwagen Bank National Marine Sanctuary (SBNMS) boundaries (dashed line) along with 3-digit 30 minute blocks used for groundfish management by the NEFMC. The vast majority of SBNMS lies within Block 124, a primary inshore fishing ground for Gulf of Maine Atlantic cod (*Gadus morhua*).

4. Create a voluntary recreational fishing vessel trip data reporting system. The system would be implemented as a web page on the SBNMS web site and be advertised at local ports and through local fishing organizations. The primary rationale for this action is to gather information on recreational uses of the Sanctuary. At present, information is very limited for recreational uses of SBNMS. Given that recreational fishing has a substantial impact on Gulf of Maine cod fishing mortality, it is possible that recreational fishing restrictions will be increased by the NEFMC. In this context, documenting the importance of Stellwagen Bank as a recreational fishing area may be important for easing or increasing current fishing restrictions (e.g., bag limits, size limits, spatial closures).

5. Request that the NEFMC require all commercial fishing vessels to use a Vessel Monitoring System within SBNMS The lack of fine spatial scale data on commercial fishing operations within SBNMS is a substantial source of uncertainty. At present, only rough estimates of the total value of extractive benefits can be made. The requirement to carry VMS would improve the information base for Sanctuary management and promote effective enforcement of fishing restrictions within the WGOM Closed Area Adaptive Management Zone (see Item 3).

APPENDIX D
Scenario 3A

MEMORANDUM

TO: John Williamson, Chairman
Ecosystem-Based Management Working Group

FROM: Sustainable Extraction Team (Scenario #3)
(Sustainable Use and Protection Team)

DATE: April 1, 2004

RE: SUSTAINABLE EXTRACTION SCENARIO

Ed Barrett, David Casoni, Tom DePersia, and David Pierce met to discuss the third scenario (straw man management option) for Stellwagen Bank Ecosystem-Based Management. We were guided by the definition we adopted at our last Working Group meeting. That definition was:

Ecosystem-based sanctuary management (EBSM) integrates knowledge of ecological relationships to manage impacts within sanctuary boundaries. The general goal of EBSM is to protect the ecological integrity of the Stellwagen Bank National Marine Sanctuary while recognizing that the sanctuary is nested within Gulf of Maine large marine ecosystem. Effective implementation of EBSM should: (1) consider ecological processes that operate both inside and outside sanctuary boundaries, (2) recognize the importance of species and habitat diversity, and (3) accommodate human uses and associated benefits within the context of conservation requirements.

We began our meeting by agreeing that the straw man scenarios #2 and #3 seemed very close to each other. The distinction between “Balanced Protection and Extraction” and “Sustainable Extraction” was unclear. Sustainable extraction implies protection and wise management with balanced uses. I informed the group that Ben Haskell indicated this option might eventually be combined with #2, and that #3 might involve some justified access to the Western Gulf of Maine closed area [note: that would seem impossible in light of Amendment 13 rules]. We concluded a better title for our scenario was “Sustainable Use and Protection.”

Before working on the straw man we discussed the ecosystem-based management definition. We all expressed concern that protecting the Sanctuary’s ecological integrity (EI) presumes we understand that integrity and to what extent protecting that integrity can be compromised by processes operating outside the Sanctuary (i.e., in the Gulf of Maine). Furthermore, we agreed that first knowing what to protect only then allows development of protective measures to balance against sustainable extraction strategies.

We perused various definitions of EI (including those provided by Peter Auster), and we concluded that most pertained to land and not marine ecosystems that tend to have poorly defined boundaries and are affected by large-scale processes, such as the North Atlantic Oscillation (NAO). The NAO influences environmental conditions in the Gulf of Maine including the Sanctuary. As an example, we highlighted recent years’ lowered abundance/availability of sand eels and wondered if lowered abundance and/or availability might be affected by a lack of copepods caused by some NAO effect. I had recalled the 2002 paper, “Sand eel recruitment in the North Sea: demographic, climatic, and trophic effects.” Among other things, availability of prey species (*Calanus* copepods) was found to be important for juvenile sand eel survival. In the final report submitted to DMF, “Surveillance, monitoring, and management of Northern Right Whales in Cape Cod Bay,” Center for Coastal Studies researchers

studying copepod abundance continue to provide insights into whale aggregations and copepod prey. Prey abundance in early 2003 was too low to promote formation of Right Whale feeding aggregations in Cape Cod Bay.

Our reference to the NAO was prompted by published research co-authored by Working Group member, Jon Brodziak (“Marine ecosystem assessment in a fisheries management context”). He and his colleagues tried to suggest a “useful beginning for the difficult task of operationalizing [sic] ecosystem-based fisheries management.” One noteworthy conclusion was: “...*More importantly, now that landings, income, and the number of vessels are declining and management measures have been enacted (e.g., area closures on Georges Bank, mesh size limits, etc.), the abiotic and internal biological processes may become more important factors determining the contemporary status of this ecosystem.*” This conclusion added to our concern that protecting ecological integrity will be a difficult-to-describe goal at this time especially for this longstanding valuable fishing ground to ports around its perimeter.

We also considered the 1998 paper “Environmental variability effects on marine fisheries: four case histories” by Hofmann and Powell (In: Ecological Applications). They concluded that variations in catch for four economically harvested species on Georges Bank reflect combined effects of biological interactions, response to fishing pressure, and environmental variability. For Georges Bank they stated that the increase in cod and haddock in the mid-to late 1970s was not directly related to fishing pressure. They believed mild winters in the early 1970s and a large increase in zooplankton standing stock might have caused the cod/haddock increase. They also extensively described the NAO and its implications for Northwest Atlantic cod.

Goal

We focused on our charge, the first being our goal for the straw man scenario. That led us back to the scenario title: “Sustainable extraction.” The group felt protection of Stellwagen Bank resources was important to the public and certainly to commercial and recreational fishermen whose livelihoods depend on Stellwagen fishing at one time or another.

We suspected that our group’s title versus the second straw man (Balanced Protection...) had an important implication. It seemed to suggest that commercial fishing, in particular, negatively impacts the Bank and Sanctuary, and fishing’s impact is an over-riding concern. Although we weren’t certain this was the intent, we agreed the public and SAC might consider it in that manner unless it’s made specific that “protection” also refers to non-fishing impacts having a major impact on Sanctuary habitat, such as sand and gravel extraction, waste disposal, shipping and cruise ships, and the laying of cables.

Through consensus we agreed to the following straw man goal: *Recognizing (1) the Sanctuary’s uniqueness is substantially due to its importance as a coastal fishing ground at the doorstep of many Massachusetts’ coastal communities and fishing ports; (2) Sanctuary bottom and water column habitats are impacted to varying degrees by human activities such as waste disposal, commercial fishing, shipping, cruise ships and cable-laying in the southwestern Gulf of Maine, especially in the Sanctuary itself; (3) fisheries management/conservation and habitat protection in the Gulf of Maine, including the Sanctuary, are the responsibility of the New England Fishery Management Council, acting under the authority of the Sustainable Fisheries Act, and coastal states; and (4) the Sanctuary is not a closed system but is part of the dynamic Gulf of Maine ecosystem, the goal of “Sustainable Extraction” is to:*

(a) continue region-wide support for management, collaborative research, acquisition of fisheries-dependent information, and exploitation/extraction policies and initiatives leading to:

- (i) an understanding of and improved protection of the Sanctuary’s ecological integrity,
- (ii) knowledge about the extent to which natural and human events inside and outside the Sanctuary affect that integrity, and
- (iii) an improved understanding of socioeconomic impacts of measures required to protect that integrity.

- (b) maintain existing Sanctuary fishing activities consistent with fishery management council management plans with their requirements for sustainable fisheries, habitat protection, and bycatch reduction, and
- (c) strive for biological “successes” (e.g., increased fish abundance and diversity and improved habitat) while avoiding social “failures” caused by alienation of users, disruption of the historic fabric of fishing communities, loss of or inadequate sharing of socioeconomic benefits, and inadequate conflict resolution mechanisms.

Compatibility with Sanctuaries Act Goals

After agreeing to this proposed goal, we discussed if it was consistent with the Sanctuary Management Act goals. We concluded it was quite consistent with the goals of the National Marine Sanctuary System. Those goals are: *(1) to enhance resource protection through comprehensive and coordinated conservation and management tailored to the specific resources that complement regulatory authorities; (2) to support, promote, and coordinate scientific research on and monitoring of, Sanctuary resources to improve management decision-making in the Sanctuary; (3) to enhance public awareness, understanding, and wise use of the marine environment; and (4) to facilitate, to the extent compatible with the primary objective of resource protection, multiple uses of the Sanctuary not prohibited pursuant to other authorities.*

Information Needs for Scenario Implementation

We concluded the following information is required for this scenario. We also determined that these same requirements pertain to the other scenarios as well.

- (1) Protecting ecological integrity is a central element of ecosystem-based management (note above definition), but first we have to understand what it is before we can protect it. Sanctuary staff, government officials, the public, fisheries and habitat managers, and the fishing industry must understand what must be protected. Once understood, then means to provide that protection can be developed. There are a number of definitions for the Sanctuary to consider, and they’re all challenging to understand, communicate, and defend. Many of the definitions are lofty, esoteric, and demand expensive-to-obtain data/information. We concluded that ecosystem-based management with its objective of protecting ecological integrity only can be successfully implemented if the objective is measurable and attainable. When is integrity at risk? What parameters will enable us to make this judgement?
- (2) Vastly improved knowledge of the importance of Stellwagen to the Commonwealth’s fishing industry (finfish, lobster, and shellfish) is required. We noted the chapter “Fish and Fishermen” in the 1995 text, “Stellwagen Bank” by Natalie Ward (pages 82-137). However, we concluded that at this time inadequate information obtained from infrequent “surveys” is being used to characterize the importance of these inshore fishing grounds. The importance has increased significantly ever since Council adoption of the Western Gulf of Maine Closed Area - a substantial year-round loss of important fishing grounds. Fishermen consistently have stressed this point. We refer the Ecosystem-based Working Group to the USGS chart with the closure superimposed. For relatively small vessels unable to traverse the closed area to open areas to the east, these vessels are forced shoreward and into the sanctuary and nearby environs. We recommended the Working Group refer back to the description of Ed Barrett’s understanding of fishing effort in the Sanctuary as fishermen pursued fish seasonally when the area(s) is open to fishing. Tom DePersia’s presentation also should be referenced. Consider that the entire Sanctuary is closed to groundfishing in April and May. Most of the Sanctuary is closed in October and November (southern portion). In June the northern portion is closed. A NOAA Fisheries Chart is attached for your reference. Lobstering occurs year-round in the Sanctuary. Recreational fishing is year-round although focused primarily from April through October. [Note: Gloucester fishermen met with David Pierce to be briefed on what information the

Team and Working Group need to make informed decisions on Stellwagen fisheries. Charts will be provided early in April.]

- (3) Cod movements within and without the Sanctuary must be comprehensively described. Extensive tagging data are available for this task. For example, there are tag/recapture data from the SMAST Cod Tagging Project that is specific to the Sanctuary. About 9,600 cod were tagged in the Sanctuary from August 2000 through December 2003. These and other tagging data will enable an assessment of the fidelity of cod to the Sanctuary. We noted that SMAST data indicated 55% (135 fish) of recaptures were outside the Sanctuary and 45% (111 fish) were recaptured inside. Of the 111 recaptures, 31 were caught by one vessel within one day of tagging. Fifteen percent (15% or 36 fish) of all recaptures were from the Great South Channel and Georges Bank. Twenty percent (20% or 48 fish) moved north into the Gulf of Maine.
- (4) Abundance and distribution of juvenile cod relative to the Sanctuary and nearby environs (e.g., state waters) must be characterized to understand the importance of the Sanctuary to the GOM ecosystem. The Commonwealth's Division of Marine Fisheries has data from 1978 to the present on distribution and abundance of age 0, age 1 and older cod in state waters.
- (5) A vastly improved understanding of the sand eel distribution and abundance in the Sanctuary and factors affecting that distribution/abundance are required. Sand eel are an important prey for many Sanctuary migrants, such as marine mammals (e.g., humpback whales), tuna, and cod.
- (6) An accurate and comprehensive description of Sanctuary bottom habit is required. We agree the recent USGS chart showing sediment type is useful; however, it makes no distinction between coarse sand and hard bottom, especially cobble and larger stone, including rock piles. Areas with coarse sand will not support permanent, prominent 3-D structure important for fish (e.g., shelter from predation). Coarse sand is found in high-energy environments where wave and tidal action remove finer sediments to be transported and deposited elsewhere.
- (7) To better appreciate the importance of the Sanctuary and the nature of bottom habitat, Sanctuary and fisheries managers (i.e., New England Council), fishermen, and the public should be provided with more underwater video and photos because "a picture paints a thousand words." This visual information will create "common currency" to bridge the gap between technical descriptions of Sanctuary habitat and common understanding. We noted the SMAST work on Stellwagen and the many hours of underwater video observations taken with their lighted pyramid for assessing sea scallop abundance and observing/characterizing fish/scallop habitat. More work of this sort will be helpful to Sanctuary managers. With that said, we concluded a just-released poster of Sanctuary habitat, sanctioned by the Sanctuary (logo on poster) is misleading and, frankly, appears to be very deceptive. The beautiful depiction of a rock reef (parallel drawn to coral reefs) is a composite of different sites in the Sanctuary. *This artist's rendition with all its marine life juxtaposed appears as "trick photography" and an attempt to portray the bottom not as it is but as some would like it to be.*
- (8) Definitions and measures of species diversity that are meaningful to those who might be asked to maintain/enhance/conservate biodiversity. We reached this conclusion after reviewing a Nature article, "Getting the measure of biodiversity," in which some relevant conclusions of the authors were: (a) biodiversity is a fundamentally multidimensional concept that cannot be reduced sensibly to a single number, even though policy-makers want a single number; (b) knowing diversity (however, measured) of one place, group, or time is in itself more-or-less useless; and (c) the study of biodiversity is an ever-bigger research enterprise. Although we agreed biodiversity conservation is an admirable goal due to its intrinsic value, we concluded the poor definition of biodiversity makes it impossible for us to factor the concept into our Stellwagen Bank "Sustainable Extraction" scenario.
- (9) A vastly improved understanding of the chemical and physical oceanography of the Sanctuary is needed. This includes a better understanding of how changes in the Gulf of Maine ecosystem affect the Sanctuary component. Ecosystem-based management includes the ability of sanctuary managers to distinguish human impact from natural perturbations that may cause dramatic changes to the sanctuary. We concluded it would difficult to accomplish without Sanctuary managers first

understanding Gulf of Maine oceanographic influences on the sanctuary representing a southwestern location in the Gulf.

- (10) Predator-prey relationships of Stellwagen marine living resources must be better defined and the food web understood. For example, we concluded the predator-prey relationships may be “out of balance” due to very high abundance and unusual seasonal availability of spiny dogfish in the Sanctuary and elsewhere in the Gulf of Maine. Dogfish are opportunistic predators and consume extremely large amounts of pelagic species (e.g., herring). We wondered if this dogfish biomass might have an impact on sand eel abundance and availability. Do large schools of dogfish deter sand eels from residing on the Bank? Since larger dogfish are finfish predators, and the Councils are attempting to build female dogfish to even higher biomass levels, will that future increased abundance affect the Sanctuary’s eco-dynamics?

Management tools to implement the scenario

We concluded that current management tools are adequate to implement this scenario. The New England Fishery Management Council is furthering its efforts to protect fisheries habitat.

Contrasted with the management tools, the means (primarily funding) to satisfy the all-important information needs are seriously lacking. Therefore, consistent with this scenario’s goal and the Sanctuary’s philosophy of obtaining user support for Sanctuary use and protection initiatives (partnerships for stewardship), we concluded there must be an emphasis on:

- (1) increased observer coverage of fishing vessels in the Sanctuary,
- (2) better planned and coordinated future cooperative Sanctuary research, especially with fishermen, and
- (3) improved monitoring of biological and environmental parameters with an emphasis on the outfall especially with regards to effluent impacts on fish distribution and abundance in the western section of the Sanctuary.

Indicators/metrics to assess effectiveness

In progress.

APPENDIX E

Scenario 3B

Below is a draft management scenario 3 for our discussion. Note that our task is to insure that the scenario meets the definition of EBSM as follows:

Ecosystem-based sanctuary management (EBSM) integrates knowledge of ecological interrelationships to manage impacts within sanctuary boundaries. The general goal of EBSM is to protect the ecological integrity of the Stellwagen Bank National Marine Sanctuary while recognizing that the sanctuary is nested within the Gulf of Maine large marine ecosystem. Effective implementation of EBSM should: (1) consider ecological processes that operate both inside and outside sanctuary boundaries, (2) recognize the importance of species and habitat diversity, and (3) accommodate human uses and associated benefits within the context of conservation requirements.

The scenario must discuss the following topics. At the outset, consider that I have not included anything that I feel should be set in stone and all that is contained here is meant to serve as a starting point for discussion.

1. Overall goal(s) for scenario

The goal of this scenario is to allow exploitation of marine resources under regional management authorities without additional management actions needed by SBNMS.

This scenario assumes the status quo management of SBNMS (i.e., no sand and gravel mining, no oil or gas extraction, etc.). This also assumes that resource protection is focused on avoiding local extinctions and that none of the managed activities will drive any resource or non-resource species to local extinction. Finally, here we assume that population and community dynamics are driven primarily by regional scale processes that operate at spatial scales considerably larger than SBNMS.

2. How does it meet the goals of the Sanctuaries Act?

This goal emphasizes “the primary objective of resource protection” by relying upon management authorities external to SBNMS to meet their mandated goals for sustainable development activities (i.e., CZM, MWRA), use of exploited resources (i.e., NMFS), and management of endangered species (i.e., MMPA, ESA). Such authorities need to insure management decisions meet their respective goals for minimizing impacts to the environment under state and federal guidelines (e.g., existing water quality criteria re in place for MWRA, OY and EFH mandates under Magnuson, takings issues under ESA). If we assume “resources” are those already managed under existing authorities, then existing authorities can maintain management authorities across the SBNMS boundary and no additional actions are needed.

3. Information needs in order to implement the scenario? For example, in order for this scenario to work what do we need to know about how the system functions (humans included)?

Metrics that relate success or failure of state/regional management authorities. E.g.

Water quality indicators inside and outside SBNMS.

Contaminant indicators inside and outside SBNMS.

Community metrics inside and outside SBNMS.

Population indicators of exploited species inside and outside SBNMS.

Population indicators of non-exploited (endangered) taxa inside and outside SBNMS.

Others?

4. Management tools needed to implement the scenario? For example, if conservaton of biological diversity is one goal of option than what tools are needed to achieve this goal- regulations? (who promulgates them?); zoning (where? how big? how many? by whom?); voluntary measures (what are they?); boundary modification (where?);

This scenario requires enforcement of existing regulations and a consultation process with other management authorities.

5. Indicators or metrics needed to assess effectiveness of scenario? Example: If the goal of this option is sustainable extraction than how are we going to know that we are removing fish, etc. at sustainable levels and rates? What do we monitor? (what indicators? by whom? how often?)

Metrics that relate success or failure of state/regional management authorities